Algebra Pre-Assessment

Name KEY

Write the letter of the set in the blank next to the corresponding term:

c Integer	a. $\{1, 2, 3, 4, 5, 6, \cdots\}$
a Natural	b. $\{0, 1, 2, 3, 4, 5, 6 \cdots\}$
d Rational	c. $\{\cdots -3, -2, -1, 0, 1, 2, 3, \cdots\}$
e Irrational	d. $\left\{\frac{a}{b}: for\ all\ integers\ a\ and\ b\ (b \neq 0)\right\}$
b Non-negative	e. $\{\cdots, 1.4142135\ldots, 2.7182818\ldots, 3.1415926\ldots, \cdots\}$

Perform the following operations with integers:

$$\begin{array}{r} {\scriptstyle 1\,1} \\ 213 \\ +188 \\ \hline 401 \end{array}$$

$-8 - (-5) =$

$-8 + 5 = \boxed{-3}$

$14(-12) =$

$12 \cdot 12 = 144$

$+\ 24$

$\boxed{-168}$

$180 \div 5 =$

$$\begin{array}{r} 36 \\ 5\overline{)180} \\ -15 \\ \hline 30 \end{array}$$

Perform the following operations with fractions:

$\frac{2}{5} + \frac{7}{5} = \boxed{\frac{9}{5}}$

$\frac{2}{3} - \frac{1}{2} = \frac{4}{6} - \frac{3}{6} = \boxed{\frac{1}{6}}$

$\frac{4 \to 5}{3 \to 6} = \frac{20}{18} = \boxed{\frac{10}{9}}$

$\frac{6}{5} \div \frac{1}{3} = \frac{6/5}{1/3} = \frac{6}{5} \cdot \frac{3}{1} = \boxed{\frac{18}{5}}$

Simplify these expressions as far as possible:

$36 - 4(2^2 + 3)$

$36 - 4(4 + 3)$

$36 - 4(7)$

$36 - 28 = \boxed{8}$

$4(3 + 2x) - 6(5 - x)$

$12 + 8x - 30 + 6x$

$\boxed{14x - 18}$

$-3y + 6 < 18$

$-6 \quad -6$

$\frac{-3y}{-3} < \frac{12}{-3}$

$\boxed{y > -4}$

Evaluate this expression using the given values: $2x + y^2$ if $x = 3$ and $y = -4$

$2(3) + (-4)^2$

$6 + 16 = \boxed{22}$

Circle "T" if the statement is true (valid) or "F" if the statement is false (not valid):

T (F) $3^4 = 64$

$3 \cdot 3 = 9 \cdot 3 = 27 \cdot 3 = 81 \neq 64$

(T) F $|-5| > 0$

$|-5| = 5 > 0$ ✓

T (F) 38 is an *odd* number

$\frac{38}{2} = 19$

T (F) 51 is a *prime* number

$\frac{51}{3} = 17$

(T) F $\frac{0}{k} = 0$, for any $k \neq 0$

zero divided by anything (except zero) is zero

T (F) $\frac{24}{14} = 1\frac{5}{6}$

$1\frac{5}{6} = \frac{11}{6}$ $\quad \frac{24}{14} = 1\frac{10}{14} = 1\frac{5}{7}$

T (F) $\frac{18}{25} = 60\%$

$\frac{18}{25} \cdot 4 = \frac{40 + 32}{100} = \frac{72}{100} = 72\% \neq 60\%$

$1\frac{5}{6} > 1\frac{5}{7}$

T (F) $0.002 = 2 \times 10^3$

$0.002 \approx 2 \times 10^{-3}$

$2 \times 10^3 = 2000$

(T) F $\frac{1}{3} = 0.33\overline{3}$

$$\begin{array}{r} 0.33 \\ 3\overline{)1.00} \\ -9 \\ \hline 10 \\ -9 \\ \hline 1 \end{array}$$

T (F) $(a - b) - c = a - (b - c)$, for any a, b, c

ex. $(10 - 4) - 1 \stackrel{?}{=} 10 - (4 - 1)$

$6 - 1 = 5 \neq 7 = 10 - 3$

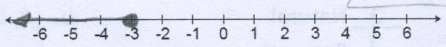
Algebra Pre-Assessment (page 2)

Draw each interval on the number-line provided:

$(0, 5]$

$-5x - 4 \geq 11$

$-5x - 4 \geq 11$
$+4 \quad +4$
$\frac{-5x}{-5} \geq \frac{15}{-5}$
$x \leq -3$



Simplify the following expressions as far as possible:

$(2^3)^2$

$(8)^2 = 64$

OR $2^6 = 64$

$\frac{3^7}{3^5}$

$3^{7-5} = 3^2 = 9$

$(2x^2 + 5x) - (3x + 7)$

$2x^2 + 5x - 3x - 7$

$2x^2 + 2x - 7$

OR $2x(x+1) - 7$

$\frac{ab^{-3}}{a^4b^2}$

$a^{1-4} \cdot b^{-3-2} = a^{-3} \cdot b^{-5}$

* negative exponents reciprocate $= \frac{1}{a^3 \cdot b^5}$

Expand the following polynomials and combine similar terms:

$5(3a - 8)$

$15a - 40$

$(b + 1)^3$

$(b+1)(b+1)(b+1)$

$(b+1)[b^2 + b + b + 1]$

$(b+1)[b^2 + 2b + 1]$

$b^3 + 2b^2 + b$
$+ \quad b^2 + 2b + 1$
$= b^3 + 3b^2 + 3b + 1$

$(2c - 3)(c^2 + 2c - 5)$

$2c^3 + 4c^2 - 10c$
$-3c^2 - 6c + 15$

$2c^3 + c^2 - 16c + 15$

Factor the following polynomials into two binomials that will be of the form (_____)(_____):

$x^2 + 6x + 8$

$(x+4)(x+2)$

$3y^2 + 14y - 5$

$(3y - 1)(y + 5)$

$2xy - 8y + 3x - 12$

$2y(x - 4) + 3(x - 4)$

$(2y + 3)(x - 4)$

Circle the letter (a,b,c,d, e) that corresponds to the one correct response:

$\sqrt{2} \cdot \sqrt{8} =$_____?

$\sqrt{2} \cdot \sqrt{2 \cdot 2 \cdot 2} = \sqrt{2} \cdot 2\sqrt{2}$
$= 2 \cdot (\sqrt{2} \cdot \sqrt{2})$
$= 2 \cdot (2)$
$= 4$

a. $\sqrt{10}$
b. $2\sqrt{2}$
c. 4
d. $1/4$
e. none of the above

$3i(2 - 5i) =$_____?
where $i = \sqrt{-1}$

$3i(2 - 5i)$
$6i - 15i^2$
$6i - 15(\sqrt{-1})^2$
$6i - 15(-1)$
$6i + 15$
$15 + 6i$

a. $-9i$
b. $6i - 15$
c. $15 + 6i$
d. -9
e. none of the above

* $[i^2 = -1]$

$\log_{10}(4) = d$
can also be expressed as _____?

a. $10^d = 4$
b. $4^d = 10$
c. $\ln 4 = d$
d. $e^{10} = 4d$
e. none of the above

$\log_b(a) = c$
$b^c = a$

Algebra Pre-Assessment (page 3)

If $f(a) = -a^2$ and $g(b) = 3b$, the function $fog = f[g(b)] =$ $-(3b)^2$ $-9b^2$ and $fog(2) =$ $-9(2)^2$ $-9 \cdot 4$ -36.

Find the slope of the following lines.

$y_1 = -5x$

slope = -5

$4x + y_2 = 0$

$y_2 = -4x$

slope = -4

$-2y_3 = 8x - 8$

$\frac{-2y_3}{-2} = \frac{8x}{-2} - \frac{8}{-2}$

$y_3 = -4x + 4$

slope = -4

Indicate if any of these lines (y_1, y_2, y_3) are parallel or perpendicular: y_2 and y_3 are parallel because their slopes are equal

Find the slope between these two points, and graph the line:

$(-2, 6)$ $(4, 3)$

$\frac{6-3}{-2-4} = \frac{3}{-6} = -\frac{1}{2}$

Find the x- and y-intercept(s), then graph the line:

$2x + 3y = -6$

$3y = -2x - 6$

$y = -\frac{2}{3}x - 2$

$2(0) + 3y = -6$

$y = -\frac{6}{3} = -2$ $(0, -2)$

$2x + 3(0) = -6$

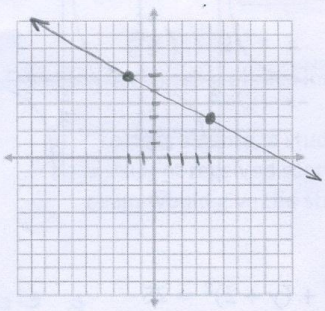
$x = \frac{-6}{2} = -3$ $(-3, 0)$

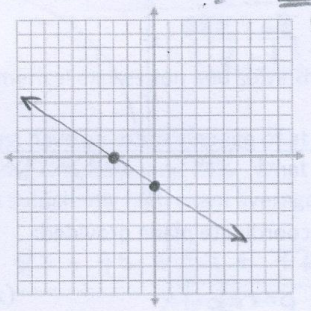
Write the equation of the line with the point $(-2, 4)$ and with a slope of $-\frac{3}{4}$, and graph:

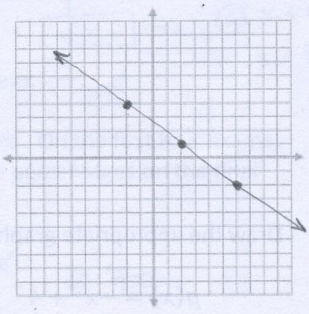
$y - 4 = -\frac{3}{4}(x - -2)$

$y - 4 = -\frac{3}{4}x - \frac{6}{4}$

$y = -\frac{3}{4}x + \frac{5}{2}$







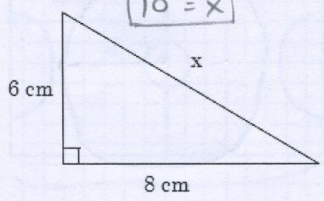
Find the length of x:

$6^2 + 8^2 = x^2$

$36 + 64 = x^2$

$\sqrt{100} = \sqrt{x^2}$

$10 = x$

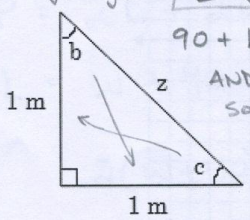


Find the length of z:
and the angle measure of b:
and the angle measure of c:

$1^2 + 1^2 = z^2$

$\sqrt{2} = \sqrt{z^2}$

$z = \sqrt{2}$



$90 + b + c = 180$

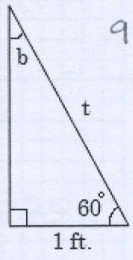
AND $b = c$

SO

$2? = 90$

$? = 45$

Find the angle of b:
and the length of t:
and the length of r:



$90 + 60 + b = 180$

$180 - 150$

$b = 30$

in a 30-60-90 $\triangle$

$2(1\text{ ft}) = t$

$2\text{ ft.} = t$

$1^2 + r^2 = 2^2$

$r^2 = 4 - 1 = 3$

$r = \sqrt{3}$ ft.

Algebra Pre-Assessment (page 4)

Write the letter of each graph in the blank next to the corresponding function:

d $f(x) = 2\sin(x)$

b $f(x) = 2\cos(x)$

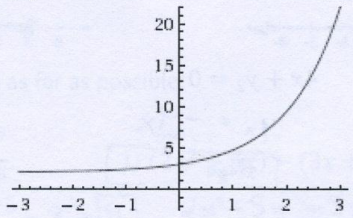
f $f(x) = \tan(x)$

c $f(x) = x^3 + 2$

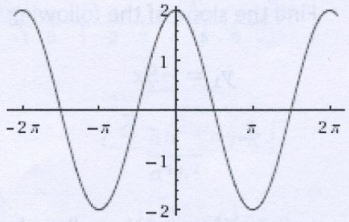
a $f(x) = e^x + 2$

e $f(x) = \ln(x) + 2$

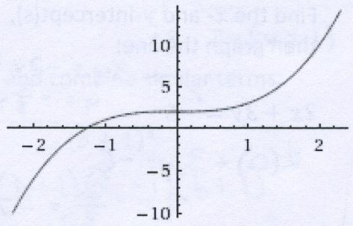
(a)



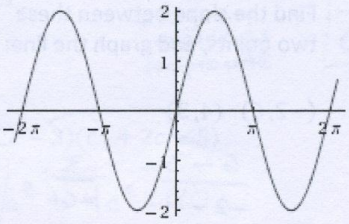
(b)



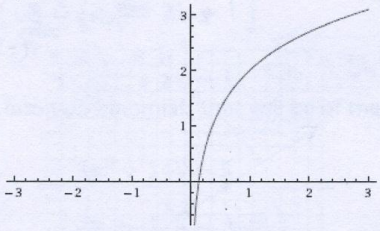
(c)



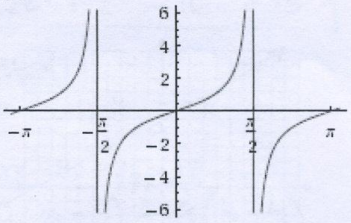
(d)



(e)

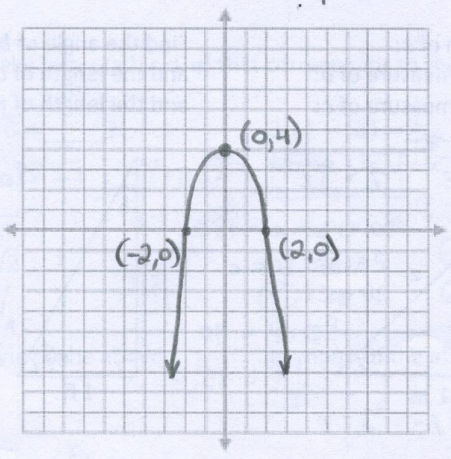


(f)



Draw the appropriate graph on the coordinate plane provided:

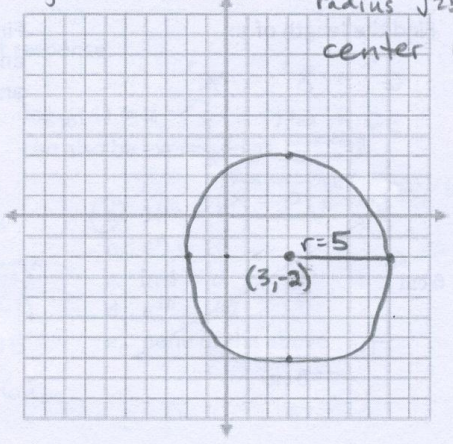
$g(x) = -x^2 + 4$ a parabola



$(x-3)^2 + (y+2)^2 = 25$ a circle

right 3 down 2 radius $\sqrt{25} = 5$

center (3,-2)



Algebra Pre-Assessment (page 5)

Translate the following numerical expression into an English statement:
(Example: $2 \cdot y \leq 8$ could be written as "Two y is less than or equal to eight")

$6x^2 - 5x - 4 = 0$ "Six x squared minus five x minus four is equal to zero."

(For extra credit, solve the above quadratic equation for x)

What values of x and y (and z) make the following system of equations true?

$2x - y = 6$
$y + 2 = x$

$2(y+2) - y = 6$

$2y + 4 - y = 6$

$y + 4 = 6$
$-4 \quad -4$
$y = 2$

$(2) + 2 = x = 4$

① $2x - 5y + 3z = -1$
② $x + 4y - 2z = 9$
③ $x - 2y - 4z = -5$

cancel x
② $x + 4y - 2z = 9$
$-$③ $-x + 2y + 4z = +5$
④ $6y + 2z = 14$

① $2x - 5y + 3z = -1$
③ $x - 2y - 4z = -5$
⑤ $-y + 11z = 9$

isolate z
④ $6y + 2z = 14$
⑤ $-y + 11z = 9$
$68z = 68$
$z = 1$

solve for y
⑤ $-y + 11(1) = 9$
$-y = -2$
$y = 2$

② $x + 4(2) - 2(1) = 9$
$x + 8 - 2 = 9$
$x = 3$

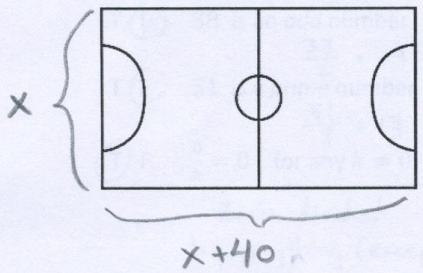
Translate each verbal phrase into a numerical expression and solve the problem:

- "To pass algebra, a student must have an exam average of at least 70%. On the first four exams, a student received scores of 82%, 75%, 59%, and 73%. What possible percentages on the final exam would give the student a sufficiently high exam average?

$$\frac{82 + 75 + 59 + 73 + X}{5} \geq 70$$

$289 + x \geq 350$
$x \geq 61$

- "A soccer field has a perimeter of 320 meters. The length between the two goals is 40 meters more than the width between sidelines. What are the dimensions of this soccer field?"



$P = 2L + 2W = 320$
$L = W + 40$

$2(W+40) + 2W = 320$
$2W + 80 + 2W$
$4W = 240$
$W = 60$